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COMPLETE SPECIFICATION.

**“Improvements in Means for Determining the Proportion of
Haemoglobin in Blood.”**

I, THEODOR WALDEMAR TALLQVIST, of No. 1 Parkgatan, in the Town of Borga, in the Grand Duchy of Finland, Russia, Doctor of Medicine and Surgeon, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement;—

It is well known that the ascertaining or measuring of the quantity of haemoglobin contained in the blood forms an important means for judging the state of disease in anaemic patients. There are already in existence various kinds of apparatus for this purpose, most of which are based upon the same principle as my said invention—namely, on the colourimetric measurement of the quantity of haemoglobin. All these give more or less exact and reliable results; but they all have one disadvantage in common—namely, that an examination of the blood with their assistance can be done only under certain conditions and that such an examination requires time and is inconvenient. It must therefore prove a considerable boon to the medical practitioner if the cumbersome work with such an apparatus (hemometer) could be replaced by one single and easy observation, which can be made immediately when the patient is being examined and independently of a dark room, a special source of light, or other special circumstances.

My investigations in this direction were preceded by somewhat extensive examinations of the natural colour of the human blood at various degrees of diseased changes in the same. In order to obtain uniform results in judging the colour of the blood I used white filtering-paper, which was neared to the drop of blood in such a manner as to make it suck the blood slowly till the paper was thoroughly drenched by it. The colour was then observed as soon as the blood-stain had lost its humid gloss, the stain being pressed against a pad of the same filtering-paper and the observation always being made by direct light. The blood, however, changes in colour very quickly, owing to the action of the air, and it therefore became necessary to make artificial copies of the blood-stains before the changes in colour had begun. By making a complete series of observations and artificial copies of the respective colours and by checking these through repeated observations I have determined that the colour of the blood-stain on the filtering-paper from different patients and with different kinds of blood diseases always corresponds with the same percentage of haemoglobin in the blood.

My invention relates to a scale of colours which I have composed on the basis of the researches described heretofore in such a manner that each shade of colour in this scale corresponds to a certain stated quantity of haemoglobin contained in the blood.

The ascertaining of the quantity of haemoglobin by the aid of my scale is performed in the following manner: A sample of the blood under examination is taken on white filtering-paper of suitable quality in the manner described above, and this sample is compared with the said scale. The figure standing opposite that shade of colour which corresponds the nearest with the colour of the said sample gives the percentage of haemoglobin in the blood under examination.

It is evident that an examination of the quantity of haemoglobin by the

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Improvements in Means for Determining the Proportion of Haemoglobin in Blood.

aid of my scale of colours will not give quite as exact results as when a proper "hemometer" is used for the purpose; but extensive comparative researches performed by myself as well as by other medical men have proved that the exactness only slightly deviates from the results obtained by the use of, for instance, the apparatus designed by Fleisch or the one by Gower. 5

In the accompanying drawing I have illustrated in plan the preferred and very convenient mode of using my improved scale.

In practice I prefer to bind the scale S either at the beginning or end of a book B of a size to be conveniently carried in the pocket, the leaves *l* of the book being made of white filtering-paper, and for convenience of use the 10 leaves are divided into three sections by lines of transverse perforations *p* and each leaf perforated longitudinally along the back of the book, as shown at *p*¹, so that the sections of the leaves can be readily removed for use. The colourimetric scale S consists of ten elements *a* of different shades of the colour of blood and indicating by the depth of colour the percentage of haemoglobin 15 in blood, from one hundred *per cent*, to ten *per cent*., which I deem amply sufficient for the purposes of the physician, the percentage being numerically indicated. In order to facilitate the comparison of the samples of blood with the scale, a small square or round hole Z is cut in each of the elements or sections of the scale, so that when the sample of blood is placed under the scale it 20 will be visible through the holes, and thus a very exact determination of the colour can be made.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:— 25

1. A means for determining the percentage of haemoglobin in blood by comparison, comprising a scale of colours varying in depth of colour to indicate variations in the percentage of haemoglobin in blood, and a receiver for the blood to be compared, said receiver being of a neutral colour and capable of absorbing the blood and leaving a mat surface, substantially as described. 30

2. A means for determining the percentage of haemoglobin in blood by comparison, comprising a scale of colours varying in depth of colour to indicate variations in the percentage of haemoglobin in blood, and a receiver for the blood to be compared, said receiver being of a neutral colour and of a material not affected by the action of the blood, but capable of absorbing the blood so 35 as to leave a mat surface, substantially as described.

3. A means for determining the percentage of haemoglobin in blood by comparison, comprising a scale of colours varying in depth of colour to indicate variations in the percentage of haemoglobin in blood, and a receiver of white filter-paper for the blood to be compared, substantially as described. 40

4. A means for determining the percentage of haemoglobin in blood by comparison, consisting of a colourimetric scale composed of separate elements differing in depth of colour in accordance with percentages of haemoglobin, and sheets of white filter-paper divided transversely into sections by lines or perforations and having a line of perforations along one edge, the whole bound in 45 book form, substantially as and for the purpose set forth.

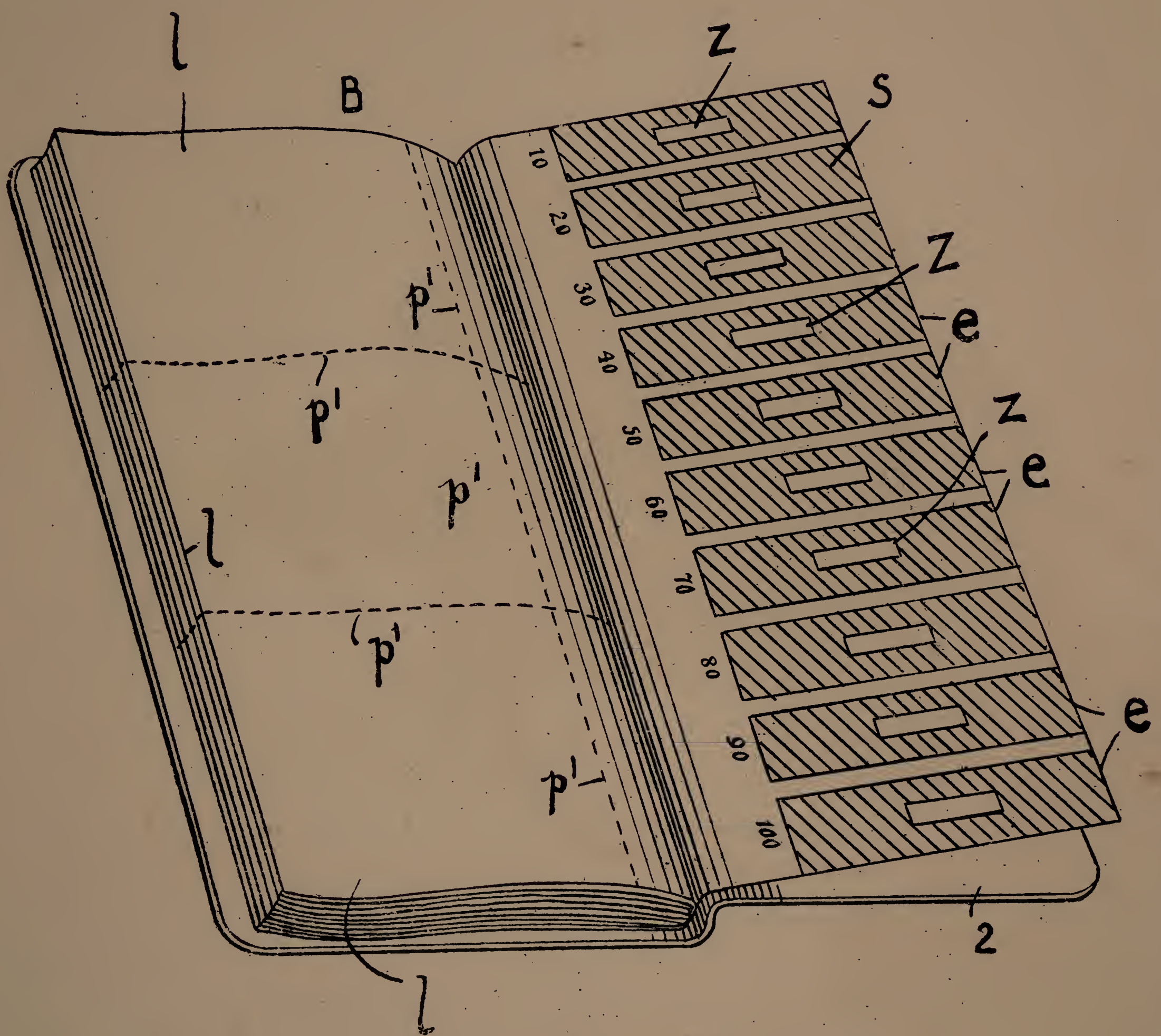
5. In a means such as described for determining the percentage of haemoglobin in blood by comparison, the use with means for receiving the blood of a scale of colours varying in depth of colour, each of the parts of said scale being provided with an aperture or slot through which the blood on the receiver can be 50 seen, in order to facilitate the comparison, substantially as described.

Dated this 8th day of October 1902.

W. P. THOMPSON & Co.
Of 6 Lord Street, Liverpool,
Agents for the Applicant. 55

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[This Drawing is a reproduction of the Original on a reduced scale.]

